CLAIMS

1. A crystal growing method comprising the steps of:

forming a step-terrace structure on a SiC surface and then removing an oxide film from the surface; and

performing at least one cycle of a process of irradiation of Si or Ga under high vacuum and then heating, and then growing a Group III nitride.

2. The crystal growing method according to claim 1, wherein the step of growing a Group III nitride is performed at a temperature lower than the temperature of the substrate during the heating step.

3. A crystal growing method comprising the steps of:

removing an oxide film on a surface and forming a flat and clean SiC surface; and

growing a Group III nitride under high vacuum, wherein a Group III element of an amount corresponding to a single monolayer or of a smaller amount is fed onto said clean SiC surface before nitrogen is fed.

4. A crystal growing method comprising the steps of:

removing an oxide film on a surface and forming a flat and clean SiC surface;

growing a Group III nitride of an amount corresponding to a single monolayer or of a smaller amount on said clean SiC surface under high vacuum, wherein a surface control element for controlling the mode of crystal growth of said Group III nitride on the SiC surface is fed first; and

feeding a Group III element and nitrogen, followed by the termination of the feeding of said surface control element.

5. The crystal growing method according to claim 4, wherein said surface control element is Ga or In.

6. A crystal growing method comprising the steps of:

controlling a SiC surface to acquire a step-terrace structure; and

removing an oxide film on the surface using a solution containing fluorine in an atmosphere of reduced oxygen partial pressure under high vacuum while the step-terrace structure is maintained.

7. The crystal growing method according to claim 1, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or (000−1)C plane.

8. A stacked structure comprising:

an SiC layer;

a AIN layer; and

Ga atoms or In atoms on the ppm order remaining between said SiC layer and said AIN layer.

9. The crystal growing method according to claim 1, comprising the step of forming a step-terrace structure on said SiC surface and removing an oxide film on the surface, and the step of removing the oxide film on the surface and forming a flat and clean SiC surface,

wherein the step of growing a Group-III nitride comprises feeding nitrogen after the Group III element has been fed.

10. The crystal growing method according to claim 1, comprising the steps of removing an oxide film on the surface and forming a flat and

clean SiC surface,

wherein the steps of growing a Group-III nitride under high vacuum comprises the steps of:

feeding, first, a surface control element for controlling the mode of crystal growth of said Group-III nitride on said SiC surface, feeding a group III element and nitrogen, followed by the termination of the feeding of said surface control element.

11. The crystal growing method according to claim 1, wherein the step of removing the oxide film comprises removing an oxide film on the surface using a solution containing fluorine in an atmosphere of reduced oxygen partial pressure, and then growing a Group-III nitride.

12. A heterojunction MISFET comprising:

a SiC substrate;

an AIN layer formed by the crystal growing method comprising the steps of: forming a step-terrace structure on a SiC surface and then removing an oxide film from the surface; and performing at least one cycle of a process of irradiation of Si or Ga under high vacuum and then heating, and then growing a Group III nitride, or wherein the step of growing a Group III nitride is performed at a temperature lower than the temperature of the substrate during the heating step;

a gate electrode formed on said AIN layer; and

a source and a drain formed on either side of said gate electrode.

13. A heterojunction laser device comprising:

a SiC substrate;

an AIN buffer layer formed by the crystal growing method comprising the steps of: forming a step-terrace structure on a SiC

surface and then removing an oxide film from the surface; and performing at least one cycle of a process of irradiation of Si or Ga under high vacuum and then heating, and then growing a Group III nitride, or wherein the step of growing a Group III nitride is performed at a temperature lower than the temperature of the substrate during the heating step;

a first AlGaN cladding layer formed on said AlN layer;

a GaN/InGaN miltiquantum well structure; and

a second AlGaN cladding layer formed on said multiquantum well structure.

14. The crystal growing method according to claim 2, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or (000−1)C plane.

15. The crystal growing method according to claim 3, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or (000−1)C plane.

16. The crystal growing method according to claim 4, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or (000−1)C plane.

17. The crystal growing method according to claim 5, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or (000−1)C plane.

18. The crystal growing method according to claim 6, wherein said SiC surface has an offset angle of 0 to 15° with respect to the (0001)S_i or

(000−1)C plane.

19. The crystal growing method according to claim 2, comprising the step of forming a step-terrace structure on said SiC surface and removing an oxide film on the surface, and the step of removing the oxide film on the surface and forming a flat and clean SiC surface,

wherein the step of growing a Group-III nitride comprises feeding nitrogen after the Group III element has been fed.

20. (New) The crystal growing method according to claim 2, comprising the steps of removing an oxide film on the surface and forming a flat and clean SiC surface,

wherein the steps of growing a Group-III nitride under high vacuum comprises the steps of:

feeding, first, a surface control element for controlling the mode of crystal growth of said Group-III nitride on said SiC surface, feeding a group III element and nitrogen, followed by the termination of the feeding of said surface control element.

21. The crystal growing method according to claim 2, wherein the step of removing the oxide film comprises removing an oxide film on the surface using a solution containing fluorine in an atmosphere of reduced oxygen partial pressure, and then growing a Group-III nitride.